Intro To ML – Soft SVM

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1. Code is added separately.
2. Placeholder.
3. Placeholder.
4. We’ll find a given w that will shatter any combination of labels .  
   Instead of requiring , we’ll demand . Since , then .  
   Now we have d equations . Converting to matrix form we get , where .  
   Since U is a matrix of dimensions with d rows consisting of independent vectors, U must be invertible. So, will separate every possible combination of
5. Placeholder.
   1. We are required to prove .  
      We’ll divide into 3 cases:  
      (1)   
      (2)   
      (3)   
      Therefore, in either of the cases
   2. We need to prove .  
      We know , therefore Proof by induction:  
        
      Base case :  
      .  
      Explanation: Perceptron updates in each iteration with , since , and , then , i.e. only increases/decreases in increments of 1 (or doesn’t change). Since , then it must be at least 1.  
        
      Induction step assuming , proof for :  
      note: last equal is from geometric series sum.  
      We get Thus proving the theorem.
   3. Both previous sections were proven for any (in a) and any (in b), therefore we can take for section a, and for section b.  
      . Combining both:  
      .